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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/186,973	11/05/1998	KATHERINE G. HEINEN	1000-2035	2495

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EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 03/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/186,973

Applicant(s)

HEINEN ET AL.

Examiner

Suk-San Foong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11/15/01.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 14-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arima et al. '151 in view of Khandros et al. '861 as previously applied and Dalal et al. (20010013423).

Arima et al. '151 and Khandros et al. '861 are applied as previously stated to be applied to claims 14-18 in the rejection under 35 USC 103(a) in the Office Action mailed 07-05-01.

The process of the combination does not include mounting a wafer on an interposer as opposed to mounting a chip or employing radiant energy to provide heat necessary to attach solder balls to the interposer.

Dalal et al. teaches the equivalence of bonding chip or wafer to any substrate and to any level of packaging hierarchy using infrared heat source (see paragraph [0068]). Electronic devices (see paragraph [0076] and Fig. 6) such as an IC chip 42 or semiconductor wafer (see paragraph [0083]) with solder balls are aligned to interconnects 22, 24, 26, and 28 (see paragraph [0077] and Fig. 6) situated on a flexible circuit carrier 23 (see Fig. 6); the flexible circuit carrier substrate 10 (see Fig. 6) may have interlevel wiring of one or more layers, and/or wiring channels on either or both surfaces (see paragraph [0085]). After alignment, the assembled device is placed in a belt type furnace to be reflowed, but solder reflow will be heated by at least one infrared heat source (see paragraph [0078]), for physically joining or bonding the chips or wafers with the electronic devices.

The disclosed infrared heat source for heating the solder reflow has a radiation wavelength that is greater than 0.7  $\mu\text{m}$  by definition. Hence, an overlap occurs between the disclosed wavelengths recited in claim 15 (see MPEP 2144.05).

It would have been within the scope of one skilled in the art to combine the teachings of Dalal et al. with Arima et al. and Khandros et al. to enable the formation of the physical bonds between the solder ball 10 and ports 11 and 12 and to enable the formation of the mounted individual chips of the combination. The temperature of the interposer would inherently be separately controlled in such a process because the infrared heat source would be applied only to the chip side of the structure.

With respect to claims 19 and 20, it would have been obvious to previously heat the interposer and allow it to cool down prior to "alignment" or to previously cool the interposer requiring heating prior to "alignment" because the additional steps would merely add complexity to the process without providing any advantages or solving any disclosed problems.

### ***Conclusion***

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

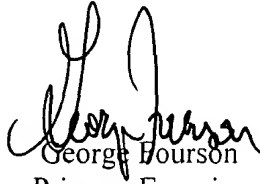
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

sf SF  
March 7, 2002

George Fourson  
Primary Examiner

  
George Fourson  
Primary Examiner  
Art Unit 2823